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MEDICAL GYMNASTICS,

OR THE

MOVEMENT CURE:

A SHORT TREATISE ON THIS SCIENCE,

AS PRACTISED AT

THE ROYAL INSTITUTIONS

AT

STOCKHOLM, BERLIN, & OTHER CAPITALS OF EUROPE.

BY

CARL EHRENHOFF.

Plus apud nos vera ratio
Valeat quam vulgi opinio.

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PREFACE.

It is, perhaps, not out of place to mention, that the remedial means treated of in this pamphlet are in no way opposed to any system of medicine; on the contrary, they often serve as a great assistance to any medicinal treatment. But it is chiefly where the other methods cannot be successfully employed, as in chronic diseased states, that these therapeutic means are most valuable and certain.

Trusting that this little treatise will be kindly received by the leading men of the profession, and by the public in general, we have formed our establishment in Rodney-street, for the practice of therapeutic movements, upon the same principle (though upon a much smaller scale) as those in London, Stockholm, St. Petersburg and Berlin. The advantages of such an establishment, before a visiting practice, are many, for, in the first instance, time is gained to the operator by the patients' coming to him; and, secondly, the applications can be performed with more accuracy, as an appropriate furniture is always to be found in such a place. However, when weakness does not allow the patient to attend daily at the establishment, the necessary movements can be applied at the patient's own residence.

It is common with most people to prejudge a thing with which they are generally very little acquainted, and this is pre-eminently the case as regards this system of movements. Therefore, should any doubt or question arise about the truth of what is asserted in this pamphlet, we invite the candid reader whose mind is open to conviction, to come to the establishment and judge for himself, as every opportunity for investigation will be afforded him.

C. E.

57, Rodney Street,
September, 1861.

INTRODUCTORY REMARKS.

In the following pages now offered to the public we make no pretension to originality. The principal source from which we have drawn our subject matter is "Die Heil Gymnastik," by Dr. Neumann, a work which, in our estimation, stands high among the very few treatises yet published for its handling the subject in a more practical and scientific point of view.

That this system of movements, or Medical Gymnastics, as it is called, is very different from ordinary gymnastics will be readily admitted by every attentive reader, who, after a careful perusal of this pamphlet, must be convinced of its deserving a place among other scientific systems for the cure or alleviation of human sufferings. And we venture to say that there is no system which can lay a higher claim to rationality and common sense, inasmuch as it is erected alone upon the firm basis of anatomy and physiology. It is both a science and an art.

Everybody likes to ride his own hobby; and in praising our system, it is not our intention to place it *above*, but on a *par* with other things; our only desire being to point out its right position, for, as every person knows, there cannot exist an universal *panacea*, and why? Because, to everything, however small, there is given a specific and well-determined use to perform. No *one* man, no *one* beast, no *one* vegetable or mineral, and no *one* system, can therefore perform but its own use, and that for which it was created. This is a law which finds its application everywhere, because it is universal—it is God's law. Now, let us see how this law is considered by men of systems. How few are they who would not say: Allopathy for everything; Homœopathy for everything; Hydropathy for everything; or anything else for everything!

The movement cure, though but a part of a great whole, like other medical systems, constitutes a whole in itself—that is to say, by itself alone it is able to procure, according to established laws, the means of curing or alleviating certain diseases. But before proceeding further we would say a few words in vindication of our system; first, as regards calling it Medical. We don't call a system, I apprehend, by that name, simply because it administers drugs, but only in so far as it has the power, under certain conditions, of restoring to harmony and equilibrium disordered functions in the living organism, which we call disease. Now, we advocate for our system this power, and call it, therefore, Medical. Secondly, as to the remedial means used, *ours* consist of movements; and as drugs are selected and prepared for certain diseases, so also are movements; thus, also, we call it an Art.

Diseases, to which our system applies itself are mostly of a chronic nature; and, being of a great variety, the enumeration of the following will suffice:

Affections of the Head and Throat, whether symptomatic or otherwise; Rheumatic Head-aches, Giddiness, Bilious Head-aches; Sore Throat, Enlarged Tonsils, Swelled Glands, &c. Diseases of the Chest: Pulmonary Consumption (incipient stage), Asthma, Bronchitis, &c. Indigestion (so called), in all its varieties; Inflammation of the Stomach (Gastritis); Inflammation of the Bowels (Enteritis); Habitual Constipation of Bowels, &c. Other diseases, such as Rheumatism, Gout, Spinal Irritation, Chorea, Hysteria, Nervous Debility, &c.

All these diseases may be benefited, more or less, by the Movement Cure; but there is another disease, named Deformity, whose prevalence, we are sorry to say, both in young and old, is such that, whether walking in the street, or entering the assembly-room, or visiting the school, in fact everywhere, we find deformity staring us in the face.

Dr. Neumann, speaking with reference to the retraction and relaxation cure-method (of which more further on), as finding its widest scope of usefulness in muscular scoliosis, says:—" But this is even the height of the Movement Cure,—a thing which few medical men can boast of—namely, that theory and practice go so completely hand in hand, that the practice is advancing the theory, and that a theory which is grounded in the greatest truth of physiology is thus assisting in the advancement of the doctrine of physiology itself." Thus may we have reason for asserting the superiority of this system over any other, at least in dealing with muscular curvature of the spine. A merely superficial view of the deformity will suffice to convince any person of the existence of *some* difference, or disordered state of the tissues of the two sides of the spine, although of what nature may not be known. Suppose this could be explained, and suppose, further, that such movements could be applied as will restore the column to its straightness; then our case is proved. Most people are acquainted with the existence, at least, of a system called the Orthopœdic treatment, and I cannot do better than again quote Dr. Neumann. "In my opinion" he says, "we commit a sin towards diseased youths by torturing them with stretching beds, on which they must lie the whole day for a long time, with compressing corsets and machines, or generally employing such a curative method, entirely opposite to all the doctrines of physiology, which could be excused in a former period, when physiological knowledge was in its infancy; but now, it is really a disgrace to medical science, if professional men who wish to be looked up to as scientific persons, consider the human organism merely as a lifeless mechanism, which they can press like wax in a machine, then extend, and finally give it a suitable form. We do not speak to those ignorant persons who wish to deceive people by expensive machines; but to the scientifically educated, professional orthopodists, and call upon them to examine impartially the system of Ling."

In order to maintain the organised fabric in its integrity, it is requisite that a provision should exist for the replacement, by new matter, of all the particles which, having performed their functions in the economy, are in process of return to the condition of inorganic matter. This metamorphosis of *reproduction*, as well as that of *waste* of matter, being accomplished through the instrumentality of the capillary vessels, the former by the arterial capillaries, the latter by the venous, it follows that when the organism is preserved in its true order, these capillaries are performing their orderly action ; but when the function of any part of the organism is disordered, the action of the capillaries of the same part is likewise disturbed.

These observations are made, in order, as we shall have occasion further on to show, that for every pathological state of the textures of the organism, there is a corresponding disorder of the capillaries of the same textures ; or, to make it more clear, the textures which are involved in disease are either *retracted* or *relaxed*, and in connexion with the former, or retracted state of the organs, stands functional disturbance of the *arterial* capillaries, whilst functional derangement of the *venous* capillaries is connected with the latter. That this is the case our practice will prove beyond doubt.

There is also another circumstance of no less importance, and which we cannot pass over in silence. We mean the relationship of the functions of the heart and lungs in health and disease. Dr. Howard Johnson says: "It has been proved by experiments, conducted by the author, upon his own person, that the average pulse during the twenty-four hours, in a healthy man, numbers about 72,73 beats per minute, and that the average number of respirations that occur under the same circumstances, during the same period, is about 19,31. So that they stand in proportion to each other, as 3,76 of the former to 1 of the latter. Now, at each inspiration, about one pint of air is imbibed. This, therefore, would be devoted to the purification of as much blood as would be impelled into the lungs by 3,76 contractions of the heart. At each contraction of the heart, or, which is the same thing, at each beat of the pulse, about two ounces of blood are pumped by that organ into the purifying apparatus—the lungs. So that the case now stands thus:—at each inspiration, cæteris paribus, in healthy individuals one pint of pure air is absorbed into the lungs to aërate, or purify 2 oz. x 3,76 of vitiated blood, and 2 x 3, 76=7,52. Therefore one pint of air is just sufficient for 7,52 ounces of blood. This constitutes the correct equilibrium between the heart and lungs.

"But if at any time this equilibrium be disturbed, so that, for example, there should be more than 7,52 oz. of blood sent for aëration to the lungs per minute, or less than one pint of air inhaled, or if that pint contain less than normal (namely, 21 per cent.) of its purifying ingredient, oxygen, then these conditions not being fulfilled, the blood is insufficiently decarbonized, and disease is the result. Instead of losing its dark colour and venous character, becoming of a bright red tint, and assuming the arterial peculiarities while permeating the tissue of the lungs, it passes out of those organs, of course more or less, in the same state as it entered them. And, inasmuch as dark venous blood owes its colour and character to the fact of its being loaded with the detritus of the old worn-out tissues, and it is only arterial, scarlet blood, which has got rid of those impure elements, and owes its brightness and excellence to the presence of oxygen, that is capable of nourishing the structures of the body, the consequence of such insufficient decarbonization of the blood must be the insufficient nourishment of such tissues. And this being the case, diseases of as many kinds as there are different tissues in the body necessarily ensue."

The importance is here clearly established, of the equilibrium and harmonious balance between the heart and lungs; and we cannot lay too much stress upon the necessity of making frequent examinations of our patients during the progress of the cure, in order to ascertain the changes that are taking place. This will also guide us in the adoption of movements for the removal of obstacles which are in the way for the restoration of the reciprocal functions of these organs.

MEDICAL GYMNASTICS, OR MOVEMENT CURE.

Man is gifted with various faculties, through whose proper development he is able to lay a foundation for his own happiness, as well as for that of his fellow-creatures. There is, however, one great difficulty which frequently is opposed to such a development. This is easily observed by anyone who, with attentive look, has followed the march of intellectual and physical life, in which the budding of a high intelligence has often been blasted, from physical causes, even in its earliest growth. It is necessary to remark that thousands of parents are constantly and sadly disappointed in the moral and intellectual progress of their offspring? Still more, need we state the cause of this disappointment? The chief cause is an erroneous method of education. But this erroneous education relates not so much to defects in the moral and intellectual department of educational training, as to the physical, which seems almost to be neglected, nay, even forgotten; and yet, is not the latter the necessary condition upon which the perfecting of the two former ought to rest? Is not the body, which consists of a brain, nerves, muscles, bones, &c., the medium, or the instrument by which we receive our impressions from, and by which we act upon, the external world? If, therefore, this delicate instrument is not in perfect order, it is clear that the intellectual power must in proportion be weakened, or even rendered imbecile. The harmony of all the parts constitutes the perfection of the body, and as the Divine Being has established certain laws in nature according to which this perfection is attainable, there remains for us nothing else than to follow the dictates of those laws, or to suffer the penalties for their infraction.

That science which teaches us these laws of nature, and by which all the parts of our frame can receive a harmonious development, has, by the ancients, been called Gymnastics.* Suppose that a youth is placed in the hands of a medical man who is thoroughly acquainted with Gymnastics, or with the effects of bodily motions rightly performed by, and applied to, the human frame. Suppose, further, that this youth has a narrow and contracted chest, a large head and abdomen, together with slender and distorted extremities. Will not this medical man, by applying the means which he possesses in this science, restore the equilibrium of the parts, cause the arterial streams to be properly distributed, give stimulus to the absorbents, that they may remove waste matter, and so produce a harmonious development of a frame, which, if left alone, would either have lingered on in a miserable existence, or have died at a premature age? This we have stated as an example of the usefulness of the Gymnastic Science properly applied. This must be equally useful at all ages; as every one, young or old, is in need of bodily exercise for the preservation of the frame.

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* This term, now-a-days, has been very much abused, and by many is understood only as a set of games, horsemanship, and public show of bodily strength and agility; but we speak here of Gymnastics as a science.

The utility of Gymnastic Science to society at large is easily comprehended when we have proved its usefulness to each individual. The ancient nations owed all their greatness to bodily exercises, which enjoyed with them the greatest regard, and which was highly encouraged by public festivities and great prizes. Their law-givers exhorted their fellow-citizens to exercises of a proper nature. The result was also that they possessed great men in abundance.

The knightly spirit of the middle ages, which was the result of bodily exercises, as tournaments, &c., would have produced something great and astounding to the world, had it only been supported by intellectual cultivation. On the contrary, the great delusions and mistakes of the eighteenth century would not have caused so much moral depravity, had more attention been paid to physical education.

Medical men of all times have acknowledged the necessity of exercise for persons of all ages, not only for the good of the body, but also for the benefit of the mind. The great Hoffman says that he has improved the intellectual faculties of persons of weak understanding by allowing them the use of proper exercise. It is, therefore, strange that in these modern times people seem to have forgotten the golden rule, so strongly and constantly urged by ancient and modern physicians, " often to rest and recruit the mind by proper bodily exercise."

Now, then, these questions arise:—What sort of exercise is the most proper? What sort of exercise causes the least loss of time? What can with greatest facility give back tone to the nervous system, promote the circulation of the blood, and put the digestive organs and all other parts of the body into their normal state of activity? Riding on horseback, fencing, walking, &c., are all very good exercises in their way, but as a few sets of muscles only are acted upon in each of these, it is clear that none of them can give that manifold variety of motions to the different sets of muscles which is necessary to their highest health. Gymnastics is the science which teaches us how to give, in a short time, to every muscle in every part of the body, that exercise which is just enough to promote the harmony of the whole system. It is useful for all ages and for all constitutions, and can be made to act in the highest degree energetically, or in the lowest degree mildly, according to circumstances, and proves itself, therefore, as useful for the strong as for the weak.

The first person who applied the Gymnastic Science as a therapeutic agent was Herodicus, who, according to Plato's statement, was the teacher of Hippocrates. He observed that some parts of the bodies of the athletæ became more developed than others, and according to this observation he arranged the muscular motions, and the science of applying Gymnastics in cases of disease received the name of *Medicina Gymnastica.*

The Gymnastic Science of modern times is not more than a hundred years old, and Dr. Tissot may be considered as its regenerator. He wrote a book on Medical Gymnastics.

The honour of having rightly understood the Gymnastic Science, and of having brought it into a system, belongs to the late and immortal Ling, of Sweden; and he may justly be considered as the founder of the new system of Medicina Gymnastica. Not less merit is due to the successor of this great man, Professor Branting, who is the present Chief Director of the Royal Institution at Stockholm, where the Gymnastic Science has been developed in high perfection.

The question may be asked by many—How is it possible that an external mechanical treatment can affect the more internal parts of our body? The answer rests with the idea of the last-mentioned word, for our organism can only be considered as one *whole;* a unity in perfect harmony with itself; and as a chemical effect can proceed from the internal to the external parts of our body in consequence of this unity, so can also a mechanical effect go from the external to the internal.* Thus, the Gymnastics is not merely a mechanical power, but it has the greatest influence both over the vegetative and the intellectual life of our frame.

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* "Dr. Marshall Hall, in his work on the Diseases and Derangements of the Nervous System, has shown the transmission of external action to internal organs, and thence the efficacy of the Movement Cure in many varieties of affection of the nervous system."

GENERAL CLASSIFICATION OF MOVEMENTS.

Movements are divided into three classes: namely, *Active* movements, *Combined*[*] movements, and *Passive* movements. *Active* movements are those which are performed by a person alone, through his own volition, with or without an apparatus.

Combined movements we call those which are executed by the assistance of one or more persons; and *Passive*, when a person submits to be acted upon by another, the former being in a quiescent state.

Active and combined movements, again, are divided into *Concentric* and *Eccentric*. Concentric movements are those in which the two points of insertion of a muscle are made to approach each other; the name (eccentric) is given to those in which the same points are removed from each other. For example: If the fore-arm be moved towards the upper-arm (flexion), and afterwards is to re-take its original position (extension); we call the one *Concentric*, the other *Eccentric* movement. Thus, in short, we have *Active-concentric*, *Active-eccentric*, *Combined-concentric, and Combined-eccentric* movements.

Combined movements consist in this, that the patient and the operator stand in antagonistic relation to one another: that is to say, the one is executing the movement whilst the other is resisting. Thus, in concentric movements the patient moves, the operator resists; and *vice versa* in eccentric movements. N.B.—The gymnast always guiding and directing the movements.

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[*] By Dr. Neumann named Duplicated; otherwise called Active-passive, Passive-active.

These movements cause a greater afflux of arterial blood to the muscles and contiguous parts, but with a difference in the concentric and eccentric movements: namely, by the former, in consequence of the folding together or relaxation of the elastic tissues, fasciæ, &c., and compression of the muscular tissue, the flow of arterial blood during the contraction is comparatively small, but increases afterwards; whereas by the latter the arterial stream experiences a great stimulation from the very commencement of the movement. The textures surrounding the muscles are extended in proportion as the eccentric contraction increases, and the muscular tissue also with a gradual increase of contracting fibres is exchanging this state for that of extension.

The increased flow of blood to the arterial capillaries is resulting in the effusion of plastic lymph, thus in the advance and support of the progressive metamorphosis (repair) of the textures. The augmentation of blood to one part of the body diminishes its supply to other parts,—hence these movements, as a diverting means, are of the greatest use in their application to disease.

Combined movements may well be compared to a blood-letting, but with this difference, however, that, although the nutritive element of the blood is withdrawn from the circulation in both cases, in the former it is used to the building up of the organism, in the latter it is entirely withdrawn from the body.

The effect of combined movements, as compared with active muscular motion, is, in both cases, a rush of blood towards those muscles which operate; the circulation is accelerated, and animal heat is generated. But by the latter, seldom individual muscles, still more seldom single fascicles of a muscle are brought into action; thus, the plastic effusion is spread over a larger portion of the body, and special organs can be but incompletely supplied with nutrition, which latter could never be reduced in single organs. The muscles also contract in one or two directions only, whereby the effect is limited to much fewer groups of capillaries.

The power of absorption is lessened by combined eccentric movements, because of the increased rapidity of the current through the veins and absorbents, being the result of the extension of these vessels and the decrease of their lumen. By combined concentric movements, on the other hand, the act of absorption is encouraged; the stream, at first slow, on account of the relaxation of the parieties of the veins and lymphatics, resumes its flow afterwards, when the movement is terminated. In this respect, also, there is a difference between these movements and active muscular motions, inasmuch as through the latter a greater number of muscles being brought into action, a more general venous state is induced.

Herein may perhaps be found the reason why persons suffering from phthisis, asthma, disease of the heart, &c., when taking active exercises, feel so much worse; whereas the same persons, when under the influence of specific movements, experience much ease. We know from experience how much a muscle will gain in size, firmness, and power, by active exercises; how much more, then, must that be the case with particular muscles, or groups of muscles brought into action by combined specific movements.

Bearing in mind what was said as to the distinction of combined movements, namely, the concentric as favouring the action of the absorbent, while the eccentric movements are stimulating the arterial capillaries—thus the one as promoting the retrometamorphosis (waste), the other the progressive metamorphosis (repair) of tissues,—it will not be difficult of explanation how, and often within a short space of time, the cavities of the body undergo transformation by the application of these movements; for instance, in reducing a large belly and enlarging a small thorax. If the effect in this instance were not transferred to the visceral organs simultaneously, the movements would be the provocation of much mischief, nay, they would prove even fatal to the patient in some cases. Take for example the two opposite cases of asthma and consumption — the emphysematous state of the lungs in the one and the state of induration of the lungs in the other.

Muscular motion acts both quickly and powerfully on the circulation of the blood, and, as we have seen, this motion can be so directed at pleasure, that it either acts upon the central or peripheral blood-vessels. It acts equally well, and with much power, on the respiration of the lungs; but here again we observe a great difference between active and combined movements. The action of the lungs is but feeble when only few muscles are brought into activity by the former movements; while the engagement of one single muscle, or set of muscles, by a combined movement, will sometimes provoke the deepest respiration. Nay, feeble patients often feel such an effort to breathe that giddiness and sparkles before their eyes appear for a few seconds. They are called *respiratory movements* when the muscles of the thorax are engaged, and are distinguished into *inspiratory* and *expiratory* movements.

The process of respiration being most intimately connected with that of hœmatosis (formation of the blood), the latter is promoted in a high degree by combined movements; hence it is that chlorotic patients feel themselves so much better by these movements, whilst active exercises, even in the open air, produce very little effect.

These movements promote also the secretion of *sweat* and *urine*, and augment the *animal* heat. In the promotion of the two former, however, combined movements seem to have very little advantage over active exercises; but with respect to the augmentation of animal heat in individual organs, it is different. Take for example a person suffering from cold hands and feet. In this case combined eccentric movements will prove to be a more certain means of restoring the heat in the affected organs than active exercises.

Passive movements consist of *Pressure*, *Compression*, *Friction*, *Percussion*, *&c.;* they are divided, according to their effects, into three classes: namely, *Arterial*, *Venous*, and *Nerve* movements.

Contraction of voluntary-contractile fibres is the act of the will, that of involuntary-contractile fibres is induced by tension, whether we look for the cause in the activity of the organism itself, or through the mechanical influence of an external agent. The effect of the former upon the arterial circulation was mentioned above when treating of active and combined eccentric movements. The effect of the latter through a mechanical tension is likewise an increased afflux of arterial blood to the capillaries of the tendinous and elastic tissues; hence the effusion of plastic lymph and development of these tissues. The arterial stimulation is the greater in proportion to the extent of the tendinous and elastic tissues; for instance, when these are extended over large surfaces in the shape of fasciæ, aponeuroses, or ligaments, —and it is particularly increased, if, in addition to the already extended organic textures through the position of the body, pressure be applied by the hand of an operator. Upon this depends, as a curative, means for inveterate constipation of bowels, friction applied with pressure to the abdomen of the patient, previously placed in an extended position.

Passive movements also promote *absorption.* If, to organic textures in a state of relaxation, local pressure* be applied, the effect first observed is a stagnation of blood in the larger and smaller veins, as also in the lymphatic vessels and absorbents. The walls of the vessels being at the same time distended, contract more forcibly on the removal of the pressure,† the effect of which is a rapid propulsion of their contents and the promotion of venous absorption—thus advancing the retro-metamorphosis (waste), or "shortens the periodical cycles of duration of the nucleated cells, constituting the textures." From this circumstance passive movements generally derived their name of *Resorbing* movements.

The third effect produced by passive movements is the promotion of *nerve-innervation.* From our experience we learn that the functional activity of organic textures is improved by pressure applied to a nerve-trunk or plexus. So, for example, is often weakness of the bladder cured by the application of pressure on the sacral plexus, above the pubic bone; as also lameness of the lower extremities by pressure on the ischiadic nerve, between trochanter-major and tuber ischii. We have seen neuralgia greatly relieved by pressure upon nerve branches, applied with friction along the same. As a remarkable case of this we will refer to a case of an elderly lady who had been a sufferer for years from this most painful malady. It was a tic-douloureux affecting the three branches of the fifth; and when the paroxysms were fully on there was a distortion of the whole face. The patient complained of piercing and cutting pains in the left eye up to the temple; at the same time along the nose, upper and lower jaw, from behind the left ear, and along the throat. The inside of the mouth was likewise affected; all the teeth were aching, and the tongue swollen and drawn to one side. The latter was at times too big for the cavity to hold it. After a few weeks' daily treatment the patient became so much better, that at the end of three months she left off all treatment, and remained perfectly well for more than twelve months. The treatment, with the exception of a few movements directed to the heart and lungs, in order to restore the lost balance between these organs, consisted chiefly of pressure, friction, and vibratory movements, applied to the affected nerves.

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* Because a more general pressure, instead of inducing stagnation of the blood in the veins, gives support to their feeble parieties, and increases the activity of the arterial capillaries, as we have seen.

† If the pressure be kept up for an inconsiderate length of time, a permanent distension of the veins is brought about, and fear may be apprehended of inducing the state called *varicose veins.*

"As a fourth main effect," says Dr. Neumann, "of passive movements is to be mentioned the stimulation to contraction of the organic muscles of the alimentary canal. If this, as Branting will have it, is brought about through the absorption in the veins of these organs by passive movements; or, if the motory (ganglionic) nerve-twigs displayed on the organic muscles, upon which pressure is exercised, take a share; or, if arterial stimulation, consequent upon tension of the tendinous tissues in contiguity with the organic muscles, be the main cause of the action, I leave that to be decided. But when it is so difficult to promote, in a normal way, contraction of these muscles by medicaments, (excessive and undue motion caused by drugs is easily induced), then the accomplishing of this effect by passive movements, of which the experience of medical gymnasts leaves not a doubt, becomes of the greatest importance."

"Passive movements generally affect the sensory or excito-motory phenomena of the nervous system, and of the absorbents."*

MAIN POSTURES.

The main postures of the body are:—*Standing*, *Kneeling*, *Sitting*, *Lying*, and *Hanging*.

Before entering into a detailed description of each of these positions, we would premise a few observations. It is a primary object to ascertain which muscles are engaged in a position and which are more quiescent, and also to what extent they are so engaged. The necessity of this will be clearly seen when we come to treat on curvature of the spine; for in such cases the position is more than half the cure. In all positions of the body, there is either active-eccentric or active-concentric contraction of the textures; and it is of importance to know that, through the former—namely, eccentric contraction—all the fasciæ, ligaments, serous membranes, &c., which are contiguous to the muscles, are distended, and thereby arterial capillary action excited, which is the more powerful in proportion to the extent of these tissues. While through the latter—namely, concentric contraction on the other hand, is induced venous absorption, considering the position (folding together) of the same; so that, in fact, arterial stimulation in this case is confined to the muscular tissue.

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* Georgii.

Having premised thus much, we proceed, and first to the

Erect-standing posture, in which the head is kept erect, the chest brought forward, the arms hanging free to the sides, the heels close together, with the toes apart, forming a right angle between the feet. "The anterior and posterior muscles of the neck and trunk, with the exception of a few muscles of the pelvis, are in active eccentric contraction; the elastic tissues forming part of the integuments of the neck and trunk, as also the fasciæ and aponeuroses contiguous to those muscles, are in a state of tension. The whole of the ligamentous apparatus of the vertebræ on the convex portions of the vertebral column, that is, on the anterior portion of the neck, posterior of the back, and the anterior of the lumbar region, is distended. In all these muscles, fasciæ, &c., is promoted arterial action. The muscles of inspiration and expiration are alternately in active eccentric and concentric contraction; and the elastic tissues of the air-tubes are by inspiration distended. The muscles of the upper extremities are, on account of their position, in a quiescent state, while the fasciæ are but slightly distended. But of the lower extremities the muscles are alternately in eccentric and concentric contraction.

The arterial circulation in general is better promoted in this posture than in any other, on account of the greater activity of the muscles in maintaining the posture; the venous circulation is slow, especially in the extremities. In the abdominal and thoracic viscera the venous and lymphatic current is kept up pretty regularly, which is easily understood from this circumstance, that the vessels of the abdomen derive great support from the distended fasciæ of the integuments, and the capacity of the thorax being increased by the position of the chest and shoulders. The innervation of the cerebro-spinal and ganglionic systems regular.

The erect standing posture, then, from the above description, is not suitable for very weak patients, and must be avoided, especially in cases of disease of the lower extremities.

Kneeling posture. The head, arms, and trunk, as in the previous posture. The weight of the body rests upon the knees, which are raised a little from the ground to prevent the feet touching the same. The muscles, fasciæ, &c., of the head, neck, trunk, and arms, are similarly engaged with the same tissues in the former posture. Those of the lower extremities are differently related. There is a powerful, though partial, stimulation of the arteries on the anterior parts of the thighs down to the knees; the stagnation of the venous current in the legs and feet being less than in standing posture.

The innervation is increased through the activity of the muscles in maintaining the equilibrium.

The kneeling posture being difficult to maintain, it is the least of all adapted for invalids.

Sitting posture. The muscles, &c., of the upper part of the body are in a similar position with those of the same part in the previous postures. These tissues of the lower extremities are at rest, the fasciæ only being distended, namely, that portion of fascia lata which is situate between the glutie muscles, its anterior portion between the extensors of the legs, and the anterior portion of vagina cruris.

On account of the flexed position of the legs, the returning stream is retarded, and, it may be added, the inferior vena cava and its branches are not afforded the support from the abdominal organs necessary to promote the venous current. The same may be said of vena porta and its branches. Hence, to the want of pressure from the integuments of the abdomen is ascribed the reason why a long continuance of the sitting posture favours venous congestion in the abdomen. The incomplete innervation, especially of the ganglionic nerves, is easily understood.

Except in cases of extreme weakness, this posture is not to be recommended for patients suffering from a slow and irregular action of the venous circulation of the abdomen.

Lying posture. All the animal muscles and fasciæ, with the exception of those of respiration, are quiescent. The progressive metamorphosis (repair), therefore, is much retarded, and a general venous state is induced. The veins within the cranium and brains are overfilled, and drowsiness is the consequence. The innervation of the cerebro-spinal nerves is exchanged for that of the ganglionic system, and sleep is induced in this posture.

In cases of extreme debility this posture is preferable. It is suitable for disease of the lower extremities; less for complaints of the head, chest, and abdomen.

Hanging posture, without the feet touching the ground. The flexor muscles of the fingers are in active concentric contraction, as also the muscles of the respiration; all the other muscles of the body are at rest. It is otherwise with the fasciæ, aponeuroses, tendons, and synovial membranes, which are greatly distended, with the exception of those of the head and neck. The blood-vessels, both arteries and veins are distended, and the consequence is the acceleration of the arterial current, and the retardation of the venous. The latter is partly owing to the compressed state of the lungs, and is clearly expressed by the dark red-coloured face in this posture. The motory innervation in the muscles of the fingers and the distended fasciæ being greatly exhausted, is the cause of the excessive fatigue or nervousness that is felt in this posture.

This posture is, of course, only adapted for strong subjects.

DOCTRINE OF THERAPEUTIC MOVEMENTS.

In the previous section we noticed the fundamental postures, and that by these alone physiological effects are produced in the organism of no slight importance. We shall have frequent occasion in the following of adverting to the subject again; for it is easy to see that in deciding upon Therapeutic Movements, in a particular case, the choice of posture is equally important.

The physiological effect of the movement will naturally be very much modified by the part of the body to which it is applied, as also by the position, which, together with the movement, (constituting what is called the movement-formula,) must be well considered, as upon that is founded the indication or counter-indication in disease.

We purpose in the following pages to give a description of a few of these Therapeutic Movements in general, as illustrating their application to particular parts of the body, their physiological effects, and their indication in disease.

Every Therapeutic Movement must be a definite movement, consisting of

a. Commencing position.
b. Intermediate position.
c. Final position.

Every definite movement has a definite form, and hence must have definite points:

1. In which it begins.
2. Through which it passes.
3. In which it terminates.

EXTENSION OF THE FORE-ARM.

This movement may be performed by either arm separately, or by both arms simultaneously. The patient being placed in position, flexes the arm at the elbow joint; the operator supports the patient's arm with one hand while taking hold of his wrist by the other (commencing position). The movement is executed either by the operator or by the patient. The one extending the arm whilst the other resists the movement, which is performed in a gradual and rythmical manner (intermediate position). The full extension of the arm is the final position.

In the former case, when the operator is the moving agent, the flexor muscles of the fore-arm are in combined eccentric contraction; in the latter, when he is resisting the movement, the extensor muscles are in combined concentric contraction.

This movement is indicated as a derivative means in hyperæmia of the thoracic viscera. It is also applied against cold hands, paralytic and contracted states of the arms.

ADDUCTION (MOVING TOGETHER), ABDUCTION (MOVING APART) OF THE ARMS.

If the arms, after being extended horizontally to the sides, be moved towards the front of the body, we call the movement adduction of the arms; and *vice versa*, abduction, when they are moved towards the sides. Suppose the patient's arms adducted, and the operator places both his hands inside the wrists of the patient. If the arms be then abducted by the operator while the patient resists the movement, the pectoral muscles, the coracobrachialis, and biceps brachii, will be in eccentric contraction; but if, on the contrary, the patient be the moving agent, and the operator resists the movement, there will be concentric contraction of the rhomboid muscles, the middle and inferior fascicles of the trapezoid muscle, supra and infra spinatus, teres major, and deltoid muscle. The adduction movement may be performed by either the operator or the patient, while the other resists. In the former case the last-named muscles are in eccentric contraction; in the latter, the same muscles are in concentric contraction.

The abduction movement (patient resisting) enlarges the thorax (chest), causes a freer respiration, and promotes the circulation in the lungs. The adduction (patient resisting), on the other hand, causes compression of the thorax, heart, and lungs, by the shoulder blades being drawn forwards, impedes the circulation in the lungs, and induces absorption, especially in the anterior portion of the same.

The abduction movement of the arms is indicated in cases of indurated lungs; that of adduction in bronchial catarrh and asthma.

FLEXION AND EXTENSION OF THE LEGS IN DEPENDENT POSITION, WITH THE BACK FLEXED BACKWARDS.

The patient stands with his back towards a vertical bar, with both arms extended, and his back bent backwards. The flexion movement commences by the patient raising one leg, with the knee bent, the operator standing at his side, with one hand over the patient's knee, resisting the movement.

The extension movement is performed by the operator, the patient resisting.

The psoas muscles, iliacus, and the anterior portion of gluteus medius, are in concentric and eccentric contraction by these movements. The fasciæ contiguous to the muscles are also distended by the latter movement, which affect the lumbar vertebræ, and is still further increased by the position.

These movements are indicated in cases of lumbar curvature. The extension movement is also applied as a derivative means for hyperæmia of the thoracic viscera, and the upper and anterior abdominal organs.

FLEXION OF THE TRUNK BACKWARDS, IN THE LONG SITTING POSTURE.

The patient is placed in an upright position upon a high seat, without back, and with his legs extended. The latter being fixed, the patient moves his body gradually backwards till it reaches the level, the operator, who stands behind the patient, resisting the movement.

The long dorsal muscles in their whole length, and in all their fibres, are in concentric contraction;

the elevation of the thorax is facilitated by the movement, which, if the arms be extended upwards, or towards the sides, will impede its elevation. Absorption is induced in the posterior longitudinal ligament of the vertebræ, whilst arterial action is promoted in the same anteriorly.

In combination with a rotated position of the trunk, the above muscles, on the side whence the rotation proceeds, (by turning to the right, the left side,) are in a more powerful concentric contraction; consequently all the organs on that side, and towards the posterior half of the trunk, in a venous state. Thus are the portions of sacrolumbaris, and longissimus dorsi, which are attached to the sacral and lumbar vertebræ of the left side, concentrically contracted, while those of the right side are extended.

These modifications are circumstances of great importance in the treatment of curvature, diseases of the chest, spleen, and liver.

COMPRESSION OF THE INTERNAL JUGULAR VEIN.

This is easier accomplished just below the angle of the lower jaw than lower down on the neck, where the vein in its course is more deep seated. The patient is requested to bend his head a little forwards, and to open his mouth, in order to relax the muscles of the face and neck. The compression is done by the operator grasping the integuments and the muscles of the neck at the above place, between two or three fingers of both his hands and the thumbs. The indication for relinquishing the pressure gradually is when the eyes become strongly injected.

Diseases against which this movement is advantageously applied, are functional derangements of the skin of the face, freckles, venous congestion, especially of the external parts of the eyes, chronic inflammation, dimness of sight, congestion of the brain and its membranes.

COMPRESSION OF OTHER VEINS, AS VENA AXILLARIS, CRURALIS, ETC.,

This is done either by the hands of the operator or by applying the tourniquet. The object of these appliances is to remove congestion by promoting acceleration of the venous current.

COMPRESSION OF NERVUS VAGUS.

A place is chosen near the sternal portion of the sterno-cleido mastoid muscle, which is relaxed by the patient bending his head to the side. Although the nerve is enclosed in the same sheath of the servical fascia, with the carotid artery and jugular vein, the pressure will not affect the artery, and in order to better reach the nerve, the patient should make a deep inspiration to empty the vein while the nerve is pressed from behind the muscle. The phrenic nerve being in close proximity to the former, at the above place, is likewise compressed. Should it be desirous, however, to compress this nerve alone, it would be done higher up on the neck—namely, opposite the third or fourth vertebral foramen, the sterno-cleido mastoid muscle being previously relaxed.

This nerve-pressure is applied with advantage in affections of the larynx and trachea—namely, against hoarseness, as also in spasmodic affections of the heart and diaphragm ; in hypochondriachal and hysterical complaints.

PRESSURE ON THE PLEXUS BRACHIALIS.

This is done by the fingers of the operator applied above and below the clavicle, the patient being placed in the reclining position, so that the pectoral and cervical fasciæ may be brought into a state of relaxation.

This movement is indicated in cases of lameness and contraction of the muscles of the arm, and affections of the nerves.

PRESSURE ON NERVUS POPLITÆUS.

The knee being flexed, the pressure is easily made by the fingers of both hands. It is useful in paralytic and neuralgic states of the legs and feet. Dr. Neumann mentions too cases of the latter, in which he succeeded in removing the pains from the foot by this means.

Pressure may likewise be applied to other nerves and plexus—namely, the second and third branches of the fifth, ischiadic nerve, plexus cœliacus, sacrales, and hypogastrica. The indication for this pressure is easily given in each case.

ABSORPTION PROMOTING PRESSURE.

Pressure on the Head.—This is done in various ways, and it is generally accompanied by tremulous motion. For instance: The operator places both his hands, with the fingers pointed, on the top of the patient's head; he now makes a tremulous motion with his hands, executing a slight pressure at the same time with the fingers on the scalp, for a few seconds; after which he separates his hands quickly, and throws them down, one hand on the patient's forehead and the other on the back of the head, also with pressure and tremulous motion at the same time.

The object of the first movement is to induce absorption in the upper parts of the brain; that of the second, to promote the same within the base of the cranium.

Friction is also used with the tips of the fingers suddenly along the sinus—namely, longitudinalis and transversales, and then along the jugular veins, with the object of deriving the venous blood from the head.

Simultaneous Pressure of Upper Abdomen and Lumbar Region; Lower Abdomen and the Sacral Bone.—

These movements are performed by the operator placing one hand flat in front of the patient and the other on the back, exercising strong pressure with both his hands simultaneously,—the object being to compress the large venous trunks of the chest and abdomen—namely, the inferior vena cava, vena porta, and vena iliaca and hypogastrica, with their branches.

These kinds of pressure are generally accompanied by combined movements of the trunk and lower extremities, and is of great value in hyperœmia of the thoracic organs, asthma, hæmorrhoids, excessive menstruation, flatulency, and enfeebled digestion.

PERCUSSION.

Percussion is applied to various parts of the body, the head, trunk, and extremities, and is generally performed with the edge of the hands.

PERCUSSION ALONG THE SPINE, LONGITUDINALLY AND TRANSVERSELY.

The former of which is done by the two hands of the operator, and on each side of the spine, the patient being generally placed in the opposite standing* position, with his head slightly flexed backwards; the latter by one hand placed across the spine.

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* The arms extended against a fixed object.

"The longitudinal percussion affects more the system of spinal nerves, and also absorbing of the veins of the chord. The transverse, on the other hand, by the slight motion it produces of the vertebræ one against the other, extends the influence to the ganglionic system, the ganglia thoracica and its branches; and to the ligament apparatus of the vertebræ, by promoting arterial action."

The former is the chief means in motory paralysis of the spinal nerves; the latter is recommended in affections of the ganglionic system, weak digestion, and constipation of bowels.

PERCUSSION OF THE CHEST

acts on the texture of the lungs; restores the thoracic nerves to their healthy undulations, modifies the action of the ciliar epithelium of the bronchial mucous membrane, and promotes the normal secretion of the same.[*]

It is indicated in tubercular disease of the lungs, asthma, hypertrophy and atrophy of the heart, the patient being placed in different postures, according to circumstances.

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[*] Branting, according to Dr. Neumann, supposes that coughing is caused in two ways—namely, either from a pathological process in the lungs, or from the ciliary epithelium being detached from the bronchial mucous membrane; by which the nerve-twigs are denuded. The cause of the act of coughing by the latter circumstance, then, is to promote the secretion of blastema for the protection of the nerves, and is thus considered as a natural effort of healing.

PATHOLOGY AND THERAPEUTICS.

We will here again introduce Dr. Neumann, who says: "Because the kinesi-therapeutic means of healing are so different from those in ordinary use, their modes of operation are satisfactorily explained only by particular views, which, though founded upon ordinary physiological researches, deviate from them in particulars; it follows, as a consequence, that in medical gymnastics views should be entertained of the nature of chronic diseases, differing in many points from those commonly adopted by medical men—views upon which again are based a method of cure quite different from all other medical systems."

RETRACTION AND RELAXATION.

Medical experience has shown the existence of a condition of permanent contraction of the animal muscles—that is, it cannot be overcome by exercise of the muscles, or, in fact, is not under the influence of volition any longer. This, when strongly developed, is called *Retraction.* There is another condition, the reverse of this—namely, of muscular expansion, which also is permanent, and is not acted upon by the will; it is called *Lameness*, *Acinesis*, or *Paralysis.* We observe, however, a state of transition in both cases, in which the will exerts some influence. It is called, in the former case, *excess of power*, incipient *retraction;* in the latter, *weakness*, incipient *lameness, paresis of the muscles.* Pathological anatomy teaches that paralysis, as well as long-continued retraction, causes atrophy of the muscles, which even degenerate into fatty and tendinous tissues, a circumstance, which is possible as a natural consequence alone from want of exercise of the muscles, and a diminution of nutrition of the muscular tissue.

When, for instance, the animal muscle is contracted either voluntarily, or by external irritation, it relaxes after a time though the cause of its contraction still remains unabated, and the limb retakes its original position if the antagonist muscle be sound and powerful, or should any external circumstances not prevent its so doing.

These latter may be the means by which the points of insertion of a muscle are made to approach each other, thus the cause of a kind of contraction, and consist of external things such as bandages, machines, crutches, &c. If these are made use of daily, for hours together, or a length of time without intermission, a rigid, cartilageous state is induced in the tissue of those muscles which are brought under their influence.

This state obtained a long time the name of *Retraction*, when most medical men knew it was widely different from ordinary muscular contraction; but at the present day men, even of eminence, hold the view of their similarity—nay, identity—and consider retraction only to be a continued contraction, or they explain it as a state of cramps; not knowing, however, that this latter affection could not possibly be kept up for any length of time in a living and tolerably sound organism without undermining the constitution at last, because cramps are identified with an excess of innervation.

When retraction of muscles was found to be, as it often is, connected with affections of the joints, and other pathological states of proximate organs, it was believed that it could not exist without some peculiar abnormal state of the muscular nerves; but it will be observed that retraction is often caused by the above mechanical contrivances without any other pathological state. And another circumstance is this, that cramps of the muscles differ in nothing from strong muscular contraction, while retraction, when greatly developed, is distinguished by the following characteristics:—

In voluntary, or spasmodic muscular contraction we observe certain parts of the muscular tissue raised above the level of the cutis, and are felt as hard protuberances; while in muscular retraction this is never the case. The skin is raised but evenly, and a hard substance is felt, like a string extended underneath the surface. It is the tendon of the muscle which gives this appearance, whereas by ordinary contraction the tendon is never raised to the surface, but remains in the depth of the soft parts. This may be studied best upon the tendo-achillis at the ordinary contraction, and in cases of pes equinus and club-foot.

The difference is further observed by the bulk of the muscle and tendon being greatly diminished in retraction, while in the other case there is a change only in the molecular arrangement which causes the uneven appearance. Retraction is accompanied, even from the very commencement, by atrophy of the parts, and this being observed on the living organism, it is the more remarkable that it should require pathological anatomy of latter times to discover.

The nutrition of the tissues undergoes a change; the current in the arterial capillaries being slow in proportion to the diminished lumen of the vessels, the exosmosis from the arterial blood in the parenchymatous blastema is arrested, when, in the compressed cells, no room exists for receiving it. Thus the textures become hard and rigid, and after a time the tendinous tissue only remains as a covering, whilst the muscular tissue disappears.

When the mechanical cause of retraction is rightly apprehended, it will be easy to see that relaxation of the antagonist muscle, from the same cause, together with the extension of the tendinous and elastic tissues differs much from paralysis.

If the process of nutrition suffered by retraction, so likewise does it in this case, only that by relaxation the increased endosmosis and the arrested exosmosis cause a turgescence of the cells from being overfilled with plasma; which latter become flaccid and relaxed. The afflux of arterial blood is also gradually lessened.

These states—namely, of retraction and relaxation—are primarily developed in the antagonistic muscles of the two sides of the body in curvature of the spine. The tendinous and elastic tissues, as ligaments, synovial membranes, cartilages, bones, arteries, veins, &c., follow the muscles to which they are contiguous in retraction and relaxation; and lastly the visceral organs, the lungs, heart, alimentary canal, liver, kidneys, &c., in their various textures, are affected by the same state.

Now, suppose the order being reversed—namely, that retraction and relaxation are primarily developed in the tendinous and elastic tissues, together with other pathological processes of the internal organs, (lungemphyseme is an example of relaxation; lung-tuberculoris, of retraction,) then the same state will follow in proximate muscles, bones, &c.

ARTERIAL AND VENOUS STATES.

In a former part of this treatise we have seen what is understood in medical gymnastics by the above expressions; and as the subject belongs partly to physiology and partly to pathology, we return to it again, though briefly, to compare it with some expressions used in pathological anatomy, such as active and passive hyperœmia, local hyperœmia and congestion, anæmia and cyanosis, &c. Dr. Neumann says that most of these expressions used in modern pathology being merely hypothetically adopted, therefore they are little dealt with in therapeutics, and play no important part in any method of cure hitherto adopted.

“ It is otherwise with regard to the expression, and conception of arterial and venous states in medical gymnastics. They are names for occurrences, which are observed in the living organism, and in such a variety of forms that their existence leaves no room for doubt. They are phenomena intimately connected with processes, well acknowledged by all physiologists—namely, those of waste and repair.

Thus, according to our experience, there is no longer any doubt about the existence of venous capillaries as well as arterial, whatever may be said to the contrary. In the function of these capillaries lies the ground for the true division into arterial and venous, for with them are connected the two processes of exosmosis and endosmosis,—exosmosis with the former and endosmosis with the latter, as Carus * has so beautifully explained.

THERAPEUTICS.

According to Dr. Neumann this subject is divided into six so-called *Cure-methods*—namely:

1. *Direct Progressive Metamorphosis—Arterial.*
2. *Direct Retro-metamorphosis—Venous.*
3. *Arterial-derivative.*
4. *Venous-derivative.*
5. *Retraction and Relaxation, or Muscle-strengthening.*
6. *Nerve-strengthening.*

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* System der Physiologie.

ARTERIAL METHOD.

Combined eccentric and passive movements, by which tendinous and elastic tissues are extended, promote this kind of metamorphosis of the organs to which these movements are applied; hence the name of *progressive metamorphosis* applied to this method. It is also called *arterial,* because it is in the arterial capillaries that this process originates. This method is employed in cases of atrophy, retracted muscular and other tissues, in œdematous, anæmic and hydropic states; and the word *direct* prefixed to this method implies that it is used immediately, or at the beginning of the cure.

VENOUS METHOD.

Combined concentric and passive movements when used in pathological states to promote disintegration of morbid tissues and their immediate absorption, are called *direct retro-metamorphosis* cure-method. It is found to be of a very wide application in most chronic diseases in which morbid matters are deposited in the organic textures; but it is hurtful and even dangerous to apply this method at the very beginning of the cure, as thereby a breach, as it were, is often made in the diseased organ, which is soon filled up by the deposition of new and more malignant matter. It is better, therefore, that it should succeed the *derivative* method, or be used in combination with the latter.

ARTERIAL DERIVATIVE.

Combined eccentric and such passive movements as effect extension of ligaments and fasciæ are also derivatives for remote organs—namely, for those which draw their supply of blood from the same arterial trunks with the muscles and fasciæ acted upon. Care, however, should be taken in applying passive movements, to avoid extension of fasciæ and ligaments in close proximity to the organ for which it is the object of the movements to act as a derivative. It is safer, therefore, to use the muscular movements alone, as it is easier to calculate the extent of their effect. Thus it is a practical rule to choose muscles remote from the organ, and a greater number of these in proportion to the size of the latter. In cases of hypertrophy, hyperœmia, and chronic inflammatory processes, this method is particularly indicated.

VENOUS DERIVATIVE.

This method consists of absorbing movements applied to a large surface of the body, to a wide ramification of the venous system. Combined concentric movements are used together with compression of the larger venous trunks, as also passive rotatory movements. This method is often used in combination with the arterial derivative, when eccentric movements are applied to muscles remote from the seat of the disease, and absorption promoting pressure to parts proximate to the same. If it be desired, for instance, to promote absorption in the thoracic organs, the two following movements may be given as an example:—Flexion and extension of both the knees in standing posture, with abdominal and lumbar pressure. Flexion of the trunk backwards in long-sitting posture with the arms extended upwards, under pressure of the abdomen and the lumbar region.

MUSCLE STRENGTHENING.

This method finds its widest scope of usefulness in cases of deformed limbs and curvature of the spine. It is, in fact, serviceable wherever is found retraction and relaxation of textures, in lung emphysema, tuberculosis, constipation of bowels, and diarrhœa.

NERVE STRENGTHENING.

Beyond the mere knowledge of the existence of nerve force, we have been left to conjecture as regards its nature and mode of operation. It has been proved, however, of late that this force like all other physical and organic forces in nature, operates in obedience to the universal law of undulation. Speaking therefore, of innervation, which generally implies the function of the nerves, we understand the axis cylinder of these nerves in undulatory motion. What the precise nature of this force is we know not, but we know beyond a doubt that it is generated " by the reactions which occur between the vesicular neurine and arterial blood. In other words, it is eliminated from the blood by a structure designed for that specific office. All the inferior phases of organisation are but preparatory measures to collect and elaborate a material for the conveyance of force to the nerve-centres." Inasmuch as the object of the previous methods is the promotion of a normal undulation of the nerves, they might with equal propriety be called nerve-strengthening; but as we possess the means of acting in a more direct way upon the nerve-trunks and their ramifications—namely, by passive movements, we have made this distinction by calling the method the *nerve-strengthening cure-method.*

Having thus given a few general outlines of the different cure-methods, we proceed to illustrate the mode of their application to disease. We have selected the following cases for our illustration :—

LUNG TUBERCULOSIS.

It is not our intention to enter into a minute diagnosis of this or the following diseases, our only object being to point out the most characteristic features in each, so as to enable the reader to better follow the application of our therapeutics.

The first main feature in this disease, then, is a primary development of *retraction* of the tendinous and elastic tissues of the lungs and bronchiæ, concomitant with congestion of the arterial capillaries of the membrane of the bronchial ramifications—whence the scarlet coloured sputa. Next comes disorganisation of the textures of the lungs; and tubercles appear.. With this commences the process of retraction of the various textures of the thorax—namely, muscles, ligaments, and cartilages. Respiration suffers in consequence of the insufficient inflation of the lungs. The thorax begins to fall anteriorily, the shoulder blades are projected and drawn forwards; and lastly, the integuments of the abdomen partake of the general retraction. The stooping posture of the patient is followed by venous capillary congestion in the head and abdomen.

Under these circumstances, the cure commences with arterial derivative movements of the lower extremeties, pelvis, hands and fore-arms. As the disease advances, the above movements should be vigorously pursued in order to increase the capillary action in all these parts as much as possible, and to promote the derivation for the lungs. Care however should be taken in the beginning of the cure to avoid those muscles which are inserted on the thorax; the reason is plain without further explanation. Should the patient feel better after a time, then may be introduced absorbing movements—namely, compression of the veins of the head and abdomen with combined concentric movements of the lower extremities; passive rotation of the arms and legs. First in the latter part of the treatment when the respiration of the lungs is considerably improved, may we apply the retraction method for the muscles and organs of the thorax, also combined concentric movements for the shoulder blade-muscles. Nerve movements for vagus, phrenicus, the ganglionic and spinal nerves may be advantageously introduced in any part of the treatment.

LUNG EMPHYSEMA.

The tendinous and elastic tissues of the lungs are liable to fall into a state of relaxation, and this is the case with the thoracic organs in this disease, accompanied by venous congestion and inaction of the arterial capillaries. Although frequently developed by inordinate efforts at inspiration, the cause of the disease is found in the abnormal innervation of the nervus vagus, phrenicus, and sympathicus. The heart is at length involved by a general relaxation of its textures, which is shown by dilatation of its ventricles, and insufficiency of the valves.

Nervous asthma is so closely allied to lung emphysema in its main features that we venture to assert them to be almost identical. The diagnosis of both is the same. The symptom which is the most characteristic in these maladies, is the act of respiration. There is a discernible inequality in the length of inspiration and expiration; the former being of much shorter duration and comparatively easy, the latter is long and laborious. This is best seen in a paroxysm of the disease; for, in order to ease his respiration, or, in fact, to breathe at all, the patient must place himself involuntarily in a certain posture—and what is this posture? Evidently that which enables him to call to his aid the whole of the *expiratory* apparatus.

Should all other means fail us in ascertaining the true state of this disease, the inspection merely of the patient's chest (the peculiar barrel-shaped thorax), would be a sufficient ground whereon to form an opinion upon the case.

The treatment in both cases is of course the same; it commences with the venous derivative method, consisting of combined concentric movements of the upper and lower extremities and the pelvis; after which they are associated with absorbing movements for the head and abdomen, also for the lungs and heart. Later on are introduced movements which tend directly to the depression of the thorax—namely, combined concentric movements of the muscles of the arms and thorax, for, unless the thorax with the lungs be reduced to their normal size, no cure is possible.

We ought to be on our guard when the use of exercises of all kinds, and the indiscriminate use of pulleys, clubs, and dumb-bells are being advocated as the means of *developing the chest.* This latter has no doubt been accomplished, and that to many a patient's sorrow too; for several instances have come under our own observation where asthma could be traced to no other source than to those violent exercises for the so-called development of the chest.

CONSTIPATION OF BOWELS.

"On no subject of medical concern is there more misconception and prejudice among the laity, than on that of the depuratory office of the bowels. And no wonder: within the first twenty-four hours of mundane existence an aperient drug is introduced into the digestive canal, and that irritative action, thus commenced, is looked on as necessary to the well-being of the individual by those whose office it is to watch over his younger years. By the time he has reached the years of self-guidance, the same necessity is impressed on his own mind, both from the mental habit, and from the organic craving of the lower bowel itself, for the daily or weekly excitation of the aperient: a craving which induces a sympathetic one in the brain, which *will not* be satisfied until the old* irritant is applied to the old spot. No matter how perfectly well the person may be—appetite, sleep, spirits, walking power in the best order, no pain or ache present, no sense of fullness of the bowels: yet is he haunted by this vision of constipated bowels; all must go wrong, if all be not already wrong, unless his bowels are *relieved;* they were open yesterday, the day before, and for a year past, but not having been open on this precise day, the worst must happen. How hard, how all but impossible, it is to drive into the understanding of patients that all this is error, every medical man of physiological education can say. It would seem as if people lived only to have stools; and not had stools in order to live. These last seem with large classes of English society, to be the alpha and omega of earthly existence, the one thing of never-fading interest, the much-loved object of daily and hourly solicitude; all the gigantic efforts of the reasoning faculty, all the empyrean flights of the imaginative faculty are postponed for the elevating function of evacuating the bowels."*

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* The same craving lies at the bottom of a fearful disease, of which indeed it is the source—namely, periodical dipsomania.

With the exception of a mechanical obstruction, this malady is grounded in inaction or vastation of the arterial capillaries of the glandular structures along the mucous membrane of the colon and rectum. The fascia of the anterior abdominal muscles, the peritonæum, and fascia pelvis and iliaca are all retracted; and probably there is retraction also of the neurilema of the ganglionic nerves, whose innervation is greatly abnormal.

For the cure of this ailment, combined eccentric movements are applied to the abdominal organs, also passive movements in the way of pressure and friction on the integuments of the abdomen in extended posture.

Anyone may be satisfied of the certain and speedy effect of the movements in cases like this.

CHRONIC DIARRHŒA.

This disease is grounded in a congested state of the venous capillaries of the mucous membrane of the alimentary canal, with relaxation of the abdominal fasciæ. It is often connected with great weakness of the muscular coat of the rectum and of the sphincter ani, which causes its lining membrane to protrude, when the parietes of the veins are in a state of relaxation (hæmorrhoids). If this state of the alimentary canal be allowed to proceed unchecked, it will pass into an inflammatory one, with all its consequences, the formation of pus, etc, and will ultimately terminate in *phthisis intestinalis.*

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* Dr. Gully.

When arrived at this state, we do not pretend to offer help any more than other systems would do; whereas at an earlier stage of the disease the movements are able to do more than palliate—nay, even cure a diarrhœa of years standing.

The direct absorbing method is indicated for the abdominal organs in conjunction with the venous derivative for the lower extremities. Pressure on the great nerve plexus is applied with advantage.

COLD HANDS AND FEET.

We now approach a subject of the utmost impotrance. What can be the cause of so much distress experienced especially among the female sex of the higher classes of society, by *cold hands*, and especially *cold feet?* The answer is easy. We will first advert to the mode of dress; and shall in this part of our subject be very short, as volumes upon volumes have been written to show the baneful effects of corsets and tight lacing; and moreover, as further on when treating of curvatures, we purpose to call attention more especially to the use of corsets. Thus, the first effect observable is a shortness of breath, the lungs being mainly compressed in their lower lobes, which prevents their full inflation. The heart suffers likewise from the general tightness and compression sustained all over the chest. As to the effect upon the blood itself and the circulation under those circumstances, the reader is referred to a former part of this book when speaking of the relation between the heart and lungs. The injurious effect of tightening any other part of the apparel, the boots, sleeves, gloves, etc., is easily understood—namely, in preventing the venous current to flow with its natural freedom towards the heart. In the second place, we wish to call particular attention to another practice equally pernicious, that of warming the feet. It is a usual custom with ladies to hold their feet to the fire till their shoes, or even their stockings are almost scorched; to take scalding-hot foot-baths, and to apply hot-water bottles to their feet in bed. Now, such practices as these will tell their own tale. For the feet *are never* warm, and *never will be*; and why? Because the very instruments through the agency of which the animal heat is supplied, are destroyed;—millions of capillary vessels have become obliterated.

This evil consisting principally of retraction of the ligament apparatus for the hands and feet with inaction or destruction of the arterial, and congestion of the venous capillaries—ligament movements are especially indicated, and, in general, the arterial method. It is often accompanied by a cold, clammy sweat; when direct absorbing movements will be of service. If this evil be not remedied in time, it will lead to other and more complicated diseases—namely, of the head, chest, and abdomen. Closely connected with cold feet, for instance, are functional derangements of the digestive organs, and venous congestion of the head; with cold hands, generally, chronic ailments of the thoracic viscera.

PARALYSIS.

We may perhaps reckon this disease as being the least managable under any form of treatment. Much however depends upon the nature and extent of it. In proportion as a greater part of the body is attacked with total loss, or diminution of sensation, or of motion, in the same proportion will our difficulties increase. The least chance of cure is in that species of paralysis in which the lower half of the body (paraplegia) is more or less impaired; there is better chance in paralysis of one side of the body (hemiplegia), and certainly the best chance of cure when it is merely partial, as of one arm, or one leg, etc.

The cause of this most dreaded and alarming disease, which is the source of depriving so many young people of the comforts and enjoyments of life, nay, even the means of earning their livelihood, must be traced to the nerve-centre of the material organisation—the brain. This is the main-spring by which, through a higher power, all our bodily organs are set to work, each in its own peculiar way. And how? "I have thus," says Dr. Holcombe, "endeavoured to point out what I conceive to be the central fact in physiology—namely, the existence of definite undulations in the axis-cylinder of the nerves. These are the causes of all vital phenomena just as the solar emanations are the causes of all terrestrial phenomena. The normal continuance of this undulatory motion is health; aberration from its type is disease, and its cessation is death. Anything which through the blood, the perepheries, or the mind, can disturb these undulations may be a cause of disease. The abnormal undulation however excited, is always the essential or ultimate element of the pathological condition. * * * The healthy functions being all maintained by the constant impinging of certain nerve-undulations on the different tissues, the first action of a morbid cause must be to increase, diminish, or, as it were, geometrically modify these undulations."

The knowledge of the origin and operation of nerve-force and its mutual relation to the arterial blood will guide us in the plan to be adopted in the treatment of this disease. With the view then of the healthy formation of the blood (hœmatosis), and the restoration to its normal type of the undulatory motion of the motory nerves, the treatment commences with the direct progressive and nerve-strengthening methods. In case of the total loss of motory power of the muscles, extended movements for the fasciæ in combination with nerve-exciting movements, such as percussion, vibration, etc., are applied. Should any improvement result therefrom, it will be time to introduce combined eccentric movements; and towards the end of the cure (should there be any hope of such an issue), absorbing movements are used for the removal of congestion of the venous capillaries and the retraction and relaxation method against retracted joints and muscles.

CHRONIC INFLAMMATION OF THE EYES.

Dr. Neumann says:—"When we behold the great number of anatomic pathological materials which in our time have been collected through the assiduity of the inquirer in the field of disease, and especially inflammation of the eyes, it is to be supposed that the knowledge of this disease would have been materially enhanced. But it is not so, for if we compare the therapeutics with the diagnosis, we find that in spite of the so-called exact anatomic diagnosis, the therapeutics are little, or not at all improved. Could we obtain a true knowledge derived from anatomic pathological researches of the eyes, the therapeutics would also be greatly improved." Now, our pathological view of this disease, as in fact of most others, is grounded in a disturbed capillary action, either in the venous or the arterial capillaries, or both, of the textures of the eye, caused by undue nerve undulation. This organ being of so small a size compared to the whole body, the effect of our movements is greatly enhanced.

Arterial and venous derivative movements are the principal means used in such cases; and in order to ascertain whether the venous or arterial capillaries are congested, we have only to expose the eye to the light. In the former case the patient can well bear the exposure, in the latter not. The reason of this is easily understood, when we recollect that the venous state is characterised by relaxation of tissues, and the arterial by retraction of the same. Now the light excites to contraction the textures of the eye, thus acting beneficially upon the relaxation, and unfavourably upon the retraction.

LATERAL CURVATURE OF THE SPINE, OR MUSCULAR SCOLIOSIS.

Anatomical Observations on the Spine.—"The spinal column is an irregular bony canal, extending from the head to the lower part of the trunk, composed of several bones, so arranged, as to allow a free and perfect motion in every direction. In form it resembles two irregular cones, united to each other by their bases; the apex of the upper one ascending towards the head, while that of the lower is directed downwards. The upper cone is composed of twenty-four bones, each called a vertebra. These bones have several processes arising from them, to give attachment to the surrounding muscles, and they form what is called the true spine, whilst the lower cone, consisting of the sacrum and os coccygis, is termed the false spine.

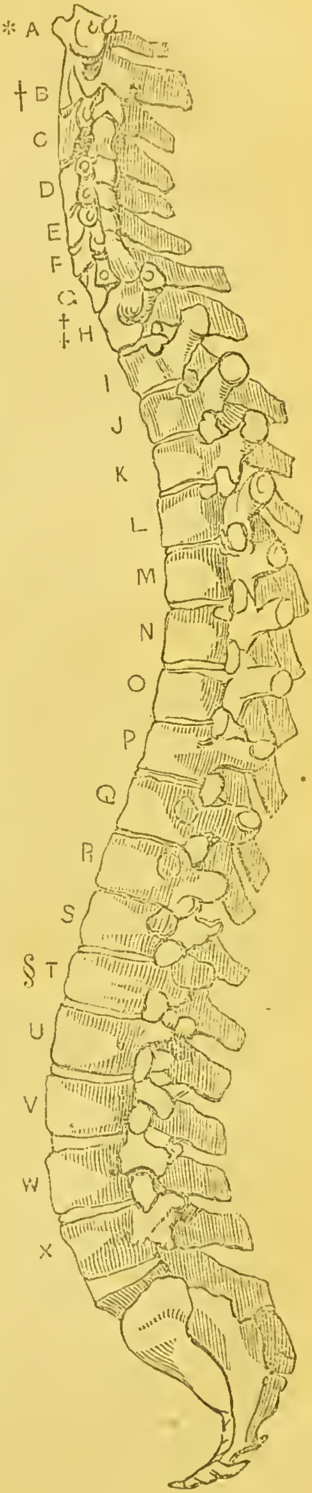
The twenty-four bones of the true spine are divided into those proper to the neck, back, and loins; those of the neck, the cervical vetebræ, are seven; those of the back, the dorsal, are twelve; and those of the loins, the lumbar, are five in number. The first bone of the neck is called the Atlas on account of its supporting the head, the second is called the Axis; the other bones are not named, but are distinguished as the first, second, third dorsal, lumbar or cervical.

Throughout the column exist certain holes, called foramina, which serve for the transmission of nerves as they pass out from the spinal marrow (medulla spinalis), which is contained in the vertebral canal. Attached to various parts of the spine, and almost surrounding it, are certain muscles and ligaments, the former of which provide for its mobility, whilst the latter maintain the due positions of the bones, one to the other.

To ensure, then, the utmost amount of mobility, at the same time giving to the spine a degree of rigidity almost equal to that of solid bone, and for the purpose of lessening to an immense extent the liability to fracture of the vertebræ, as well, also, as to avoid the frequent concussions that would have been transmitted to the brain, had a continuity of solid material existed; we find that there is placed between the bodies of each two vertebræ, a firm, dense, yet highly elastic fibro-cartilaginous structure, which is known by the name of the inter-vertebral substance, or inter-articular fibro-cartilage, and which is ever exerting its elasticity to bring back the spine to its natural position, when, from occupation or other cause, it has been thrown into a bent or curved posture—to facilitate motion—to admit of various attitudes being assumed—to prevent, or materially to lessen the chances of violent shocks being transmitted to the cerebral-centre, and at the same time, serving to bind one bone to the other, and thus most strongly assisting to avert the possibility of a dislocation in this important region."

The spine from being at birth and in early infancy a perfectly erect column gradually deviates from the straight line, till at last, when fully developed, it has assumed the present form.—(See diagram.)

Thus viewed laterally, the spinal column pr esen several curves. In the dorsal region, the seat of the principal curve, the spine is concave anteriorly; whilst in the cervical and lumbar regions it is convex anteriorly, especially in the latter.



* A 1st Cervical or Atlas. † B 2nd Cervical or Axis. ‡ H 1st Dorsal. § T 1st Lumbar.

GENERAL OBSERVATIONS ON THE CAUSES AND SYMPTOMS OF LATERAL CURVATURE OF THE SPINE.

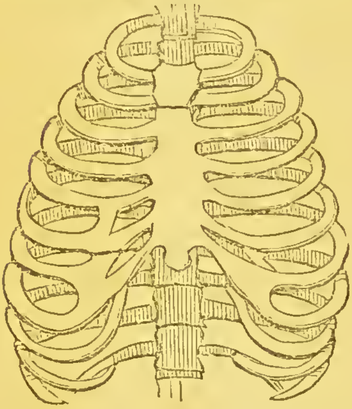
The extreme prevalence of spinal deformity, occurring too, as it frequently does, in the upper ranks of society, will afford us a reason for instituting a careful inquiry into the causes and true nature of the disease in question.

It is generally observed that lateral curvatures of the spine more frequently occur among females than males; and this is easily accounted for by referring to the occupations of boys as different from those of girls. Boys are certainly labouring under some disadvantages equally with girls, when at school, inasmuch as both are obliged to sit for hours together upon forms without backs; then to stand in order to say their lessons, with many other bad habits, which, as regards girls, are continually persisted in at home and elsewhere. But the former are no sooner free than they resume their various exercises and games; nay, boys are in constant exercise using both arms equally; and while in health they are never placed under circumstances which bring the spine into a curved position for any lengthened period. The reverse however is the case with the majority of the latter, for girls seldom take much exercise, and rarely or never to the same extent as boys do; for when they are free from the duties of the school, if the weather be fine, they are made to take what is called exercise which consists in walking, two and two, leading each other by the hand. They frequently remain in positions that throw the spine out of the erect line for a length of time together, and what is still worse, the same positions are repeated day by day, and so the deformity begins almost imperceptibly; in fact the awkward or unnatural position then becomes easier, owing to an effort being required to keep the spine erect, which is irksome; and therefore the effort is not made.

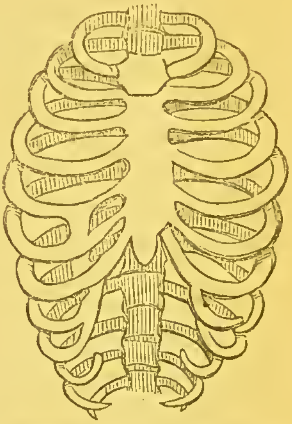
Lateral curvature is sometimes met with in males, but then it is found to depend on different causes, being secondary to some other complaint, such as lameness from disease of the hip, scrofulous disease of the vertebræ, rickets, or some inflammatory or other affection within the chest; whereas in the female it may be altogether a primary affection, the girl being in good health at the time of the curvature commencing, and having had no previous disease to which it can be traced.

Speaking of the injurious effects of stays as being one of the causes of lateral curvature, Mr. Lonsdale says :—

"The constriction of the stays at first tells equally on both sides of the chest; but will it continue to do so after being allowed to act for a length of time and in an increasing degree? I say no; for the simple reason that the ribs on the two sides do not offer the same resistance owing to the difference in the size of the two lungs; the left side of the chest contains less air than the right, which it must owing to the left lung being smaller than the right. Combined with this, there is the position of the liver on the right side to be considered, to which I shall refer again, as a cause tending to support the right side of the chest, and to render the ribs less liable to compression on this side than on the left. The constriction, then, produced by the force of the stays, must act more on the side where there is the less resistance, and this, as already stated, is the left; the consequence of which is, that the ribs on this side will become more compressed, and the capacity of the lung be also diminished.



The natural shape of the chest.

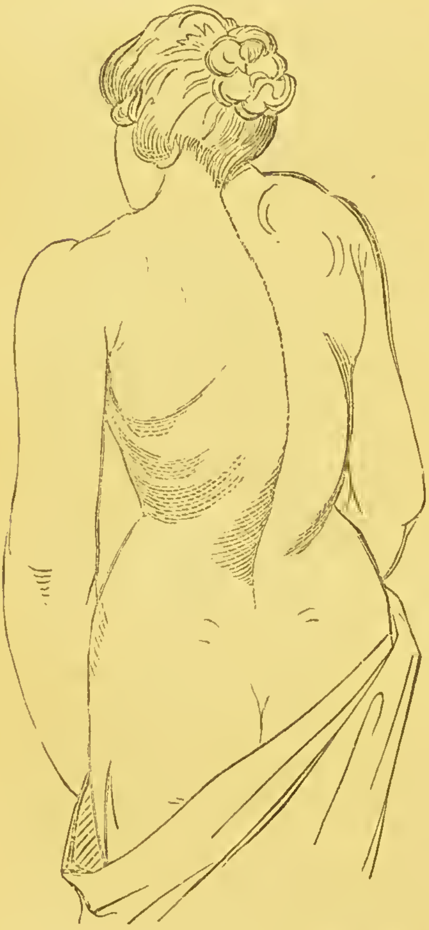


The shape of the chest produced by tight lacing.

" The deformity is thus begun, slight at first, but quite sufficient to lay the foundation for its rapid increase; for, as already stated, the less the capacity of the left lung becomes, the more duty the right has to perform; or at any rate its normal capacity is kept up, from its greater power of resistance, while that of the left is being diminished. One great cause, then, is established, if not (as I think in many cases it may be) of originating the deformity, at any rate of increasing it. I trust this view I have taken of the mode in which stays act in producing the first step or stage of the curvature may not be thought irrational; and if not, it will be easily seen how it may continue to increase it, and so lay the foundation for other evil effects arising from the same cause."

Let us now suppose that we have arrived at that stage in which the lateral curvature has reached its development. Upon the first examination then of the spine, we find it presenting an abnormal curve, the extent of which will be dependent upon a variety of circumstances, such as the length of time it has existed, the cause or causes from which it has originated, and the constitutional peculiarity of the patient. Generally the dorsal portion is found sweeping over towards the right side, whilst the lumbar occupies a position to the left; and a third bulging is observable in the cervical portion, which takes a direction similar to the lower one. Besides this, a careful investigation will usually furnish clear evidence of a rotated condition of the vertebræ. Thus, in the thoracic region, the spinous processes are rotated to the left, and the bodies of the vertebræ to the right side; in the lumbar region, on the contrary, the spinous processes are rotated to the right, and the bodies to the left side; in the cervical region is observable the same as in the lumbar one. The chin is turned towards the left, whilst the right side of the head is drawn down towards the right shoulder. The ribs of the right side are bulging outwards, the spaces between them being widened;

the scapula of the same side is tilted upwards, and its inferior angle is rendered particularly prominent, possibly on account of it having escaped from the embrace of the latissimus dorsi muscle. The right clavicle is shorter on account of the shoulder blade being drawn forward, and the xiphoid process of the breast bone is pointing more to the right. Turning to the left side, we find a very different condition of parts. The ribs are all depressed and flattened; they are sometimes so huddled and crowded together that they actually overlap each other, whilst their intervening spaces are obliterated. The left shoulder is sunk far below its natural level, and the clavicle is longer, whilst the hip of the same side is unduly ele-elevated. The right humerus is rotated inwards, whilst the left is rotated outwards; the fore-arms being rotated the reverse way. The greater tuberosity of the right humerus is turned forwards, the lesser one backwards; the same parts of the left humerus are turned the reverse way.



From the above observations on the displacement of the various bones constituting the skeleton, it is easy to see that the muscles which are attached to these bones must be affected by the deformity.

Upon the examination then of muscular scoliosis, we find the muscles affected in two ways; namely, they are either *retracted* or *relaxed*. Those muscles which are situated on the concave side of a curve are retracted, whilst those on the convex side are relaxed. Thus, in right muscular scoliosis, the *Sterno-cleido mastoid* muscle of the right side is retracted, whilst that of the left side is normal, or slightly relaxed. Bya strong flexion of the head forwards, the two muscles are retracted.

Scaleni of the right side are retracted; those of the left, normal—namely, on the head being strongly flexed forward; for in that case the relaxation of the left muscles, owing to the convexity of the cervical vertebræ, is compensated by the bulging out of the neck forwards.

Levator anguli scapulæ of the right side retracted, that of the left relaxed; because the points of attachment of the right muscle are approached towards each other on account of the shoulder blade being drawn forwards. On the left side the case is reversed. By a considerable flexion of the head forwards, however, the muscle of the two sides is relaxed, the left more so than the right.

Pectoralis major, minor, and Sub clavius of the right side are retracted, while those of the left side are relaxed.

Serratus anticus major of the right side retracted, that of the left relaxed.

Intercostal muscles of the right side are relaxed, while those of the left are retracted.

Trapezoid Muscle.—The inferior and middle fascicles (arising from the dorsal vertebræ) of the right side are relaxed, whilst the same fascicles of the left muscle are retracted. The superior fascicles (arising from the occipital bone and servical vertebræ) of the right side are retracted, those of the left are relaxed on account of the curve to the left of the cervical vertebræ. In case, however, of a strong flexion of the head forward, the latter fascicles of the two sides are relaxed.

Latissimus Dorsi.—The upper transverse fascicles of the two sides are normal, on account of the intervening space of the points of attachment remaining unaltered. This is easily explained, for, by the rotation of the spinous processes of the dorsal vertebræ to the left, those fascicles of the right muscle would be relaxed but for the rotation of the right humerus forward (the spina tuberculi minoris being turned backward) at the same time. The case is reversed with regard to the same fascicles of the left side. The inferior, longer fascicles of the right side are relaxed, those of the left retracted.

Rhomboid muscles of the right side are relaxed, while those of the left are retracted.

Serratus posticus inferior arises from the spinous processes of the two lower dorsal and two or three upper lumbar vertebræ. Passing obliquely upwards and outwards, it becomes fleshy, and divides into four flat digitations, which are inserted into the lower borders of the four lower ribs, a little beyond their angles. Thus, the inferior fascicles of the right muscle (arising from the lumbar vertebræ) are retracted, and the superior (arising from the dorsal vertebræ) relaxed. On the left side the case is reversed.

Socrolumbaris, *longissimus dorsi* and *lumbo-costalis* of the two sides of the spine are relaxed, for if the extent of surface along the transverse processes of the two sides be measured, it will be found rather increased by the rotation of the column. As the dorsal curve generally is the longest, the relaxation of the muscles of the left side is greater.

Multifidus spinæ consists of a number of fleshy and tendinous fasciculi, which fill up the groove on either side of the spinous processes of the vertebræ from the sacrum to the axis. Thus, the fasciculi situated on the concave side of the curvature are retracted, while those on the convex side are relaxed.

Obliquus abdominis externus and internus.—The posterior fascicles of these muscles of the left side are relaxed, while the anterior ones are retracted. The whole of these muscles of the right side are retracted, as also the two *Recti abdominis* and *Pyramidales* with the *Linea Alba.*

Transversus abdominis of the right side is retracted, that of the left relaxed.

The above conditions of these muscles are easily seen by this, that the space between the last ribs on the left side and the crest of the ilium is increased, while that of the right side is decreased; the breast-bone also and the attached cartilages of the ribs are drawn over to the right side, approaching the pubic bone. In fact, the vertical diameter of the abdomen is diminished.

Deltoideus, the clavicular portion of which on the right side is retracted, the same portion of the left side relaxed. The scapular portion of the right muscle is relaxed, that of the left retracted.

Coracobrachialis of the right side retracted, that of the left relaxed.

Psoas, *Iliacus internus*, *Glutei*, *Pyriformis*, *Gemelli*, *Obturatores*, *Tensor fasciæ Latæ*, *Sartorius*, *etc.*, of the right side are all retracted, those of the left relaxed. The patient sits more on the right seat and stands more on the right leg on account of the greater support which is afforded to the trunk on that side.

Quadratus Lumborum of the left side is relaxed, that of the right retracted.

Diaphragm—the right half of which is slightly relaxed, while that of the left is considerably retracted, owing to the left lung being compressed.

Such is the deviation from their normal anatomical relation of these muscles in lateral curvature; and for the better elucidation of our subject, we propose to divide the body pathologically into regions of retraction and relaxation. We must observe, however, that besides the muscular tissue, the membranes, fasciæ, ligaments, vessels, nerves, cartilages, bones, and the visceral organs themselves are involved in the pathological state of muscular scoliosis. Beginning thus with the *neck*, we find all the textures situated anteriorly to the spine in the cervical region from the lower jaw to the breastbone, generally retracted, while those posterior to the spine are relaxed, because the flexion of the head forward, in most cases, predominates over its rotation and flexion to the right side.

The Thorax.—The right pectoral region is retracted, the left relaxed; the right lateral costal and scapular regions are relaxed, those of the left retracted. The superior anterior portion of the right lung is thus in a state of retraction (indurated), whilst the other portion of the same lung is relaxed (emphysematous). On the left side the greater part of the lung is retracted—so also the heart.

The Abdomen.—The organs situated between the diaphragm and the pubic bone are retracted, with the exception of a small portion on the left side, which is in a state of relaxation.

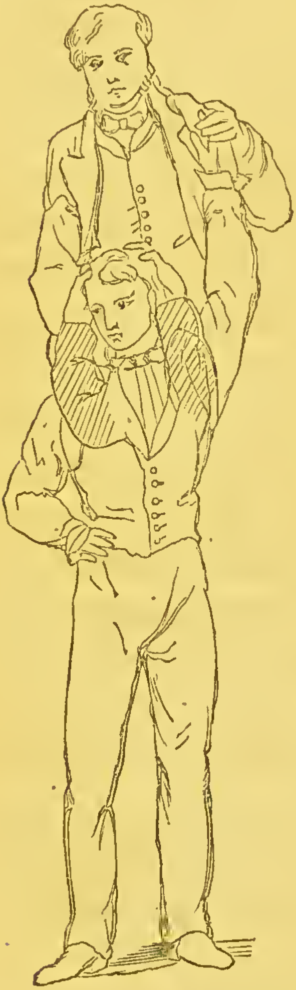
The muscles of the right femur and hip are retracted, those of the left side relaxed. A small part of the abdominal organs which lie close to the bodies of the lumbar vertebræ and the sacrum on the right side are retracted, on the left relaxed.

As a concluding part of this treatise, we beg to call the reader's attention to the following diagrams, in illustration of the treatment of muscular scoliosis by specific movements.

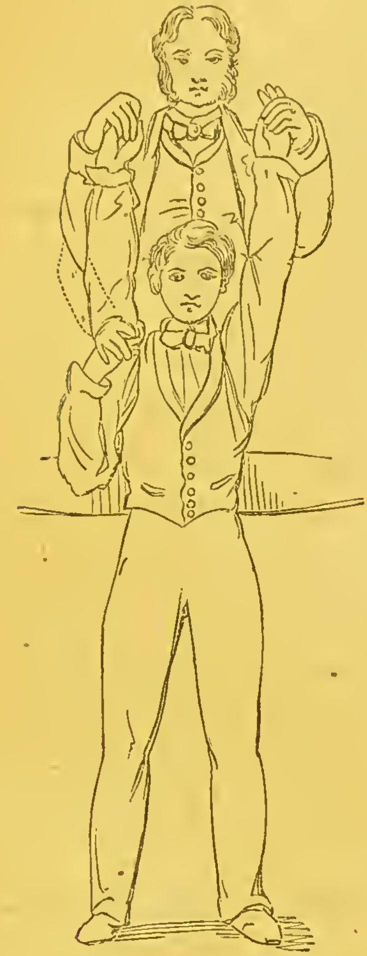
We will suppose, then, a right lateral curvature, with a considerable flexion of the head forward, and the dorsal curve longer than the lumbar.—(See Figure.)

The operator in front of the patient is resisting the latter in the effort of raising and flexing the head backwards, while the assistant behind the patient is keeping the arm extended.

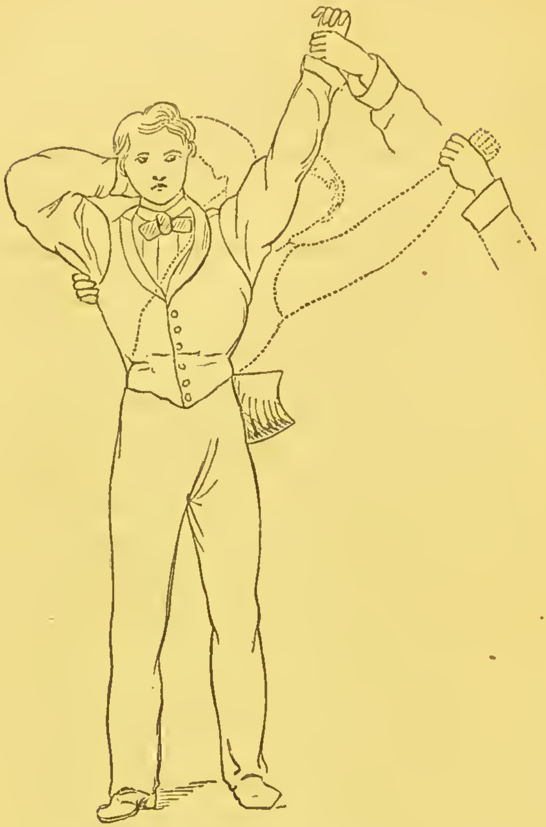
The left arm being extended, and the right foot put forward, will have the effect of extending the retracted left intercostals and the right abdominal and hip muscles, by which the dorsal and lumbar curves are compensated, and the rotated vertebræ brought back to their normal position. The relaxation of the muscles of the neck and long muscles of the back is corrected by the movement of the head, in which these muscles are brought into concentric contraction.



The two arms of the patient, as seen by the annexed diagram, are extended, and the trunk turned and flexed to the left side. The operator, who stands behind the patient, is keeping the left arm extended, while he offers resistance to the patient, who is gradually flexing his right arm.



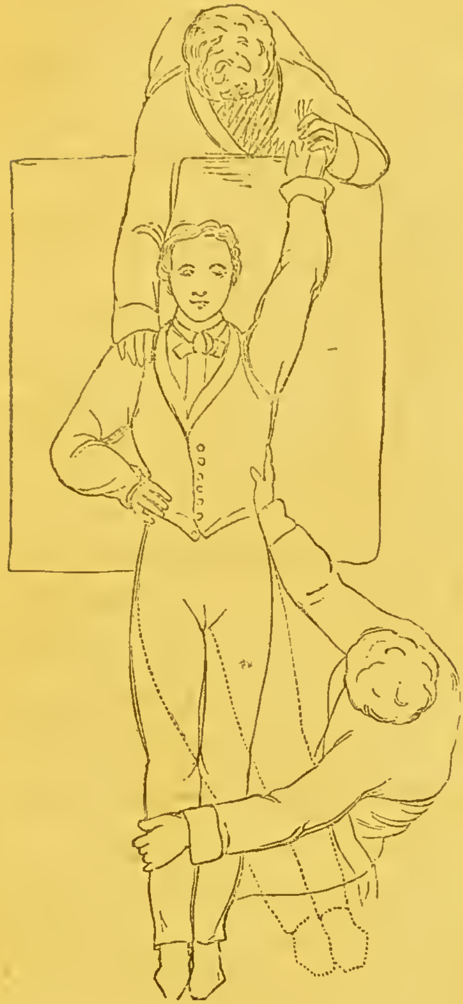
By the extended position of the left arm is the dorsal curve, by the flexed position of the left side, the lumbar curve compensated, and the rotation of the spine rectified. Through the latter position, also, the posterior and lateral fascicles of the abdominal muscles of the left side are in active concentric contraction, and those of the right side in active eccentric contraction. By the flexion of the right arm, it is noticed that the relaxed intercostals are brought into concentric contraction, but not the retracted abdominal muscles of the same side, because these latter are already, by the posture, in active eccentric contraction. Suppose, however, the patient to stand with the trunk erect, without the left arm being extended; then, although the movement of the right arm would be serviceable to the relaxed thoracic muscles, it would be hurtful to the retracted abdominal muscles, which, at the same time, would be put to concentric contraction.



The operator is extending the patient's left arm while flexing the trunk to the left, the patient resisting. The compensation of the curves is accomplished by the posture as well as the axis-rotation. The movement brings the lateral muscles of the abdomen of the right side into eccentric contraction, which will not affect the relaxed intercostals of that side, as by the extended arm the interstices of the right ribs are already diminished.

The patient is moving his legs over to the left side, the operator resisting, while the left arm is extended, and the hips of the patient firmly held.

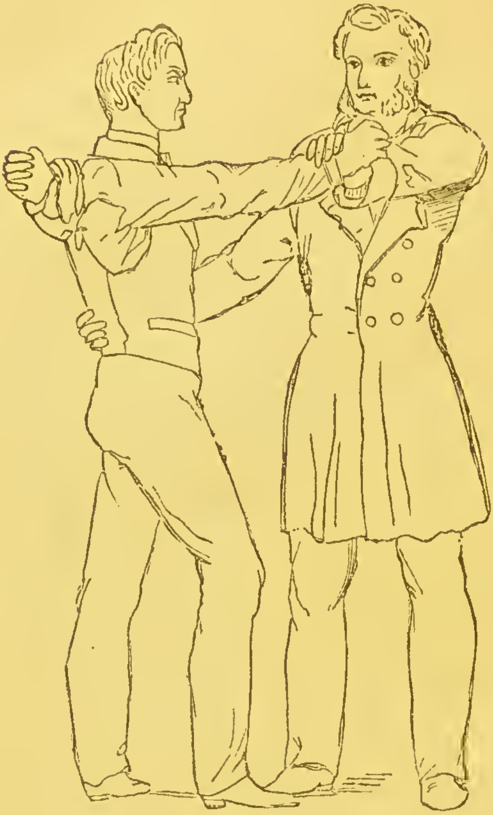
From this movement arises a concentric contraction of the relaxed muscles of the abdomen and hip of the left side. The injurious effect which this movement otherwise would have upon the retracted intercostal muscles of that side is counteracted by



the left arm being extended, which causes eccentric contraction of the latter muscles.

If, on the contrary, the patient is resisting while the operator is moving the legs towards the left side, the lateral muscles of the abdomen of the right side are in eccentric contraction, thus counteracting the retraction of these muscles. Even in this case the injurious effect of the movement upon the relaxed intercostal muscles of the right side is counteracted by the extended left arm.

The patient is offering resistance to the operator who is moving the right arm of the patient gradually outwards to the side. The pectoral muscles of the right side are in eccentric contraction by this movement. If the patient were the moving and the operator the resisting agent, the effect would be a concentric contraction of the shoulder blade muscles. The curves and rotations of the spine are equalised by the commencing position in both cases. The



ultimate effect of these movements will be a counteraction of the retracted pectoral muscles in the former case, and of the relaxed shoulder blade muscles in the latter.

The right knee in the next diagram is being pressed down while the patient is resisting, which causes eccentric contraction of the flexors of the femur, namely the psoas, iliacus, and the anterior fascicles of the gluteus medius. Turning to the other side, the left knee is drawn up by the patient under resistance of the operator, the same muscles of that side are concentrically contracted. The position of the arms prevents any injury being done to the intercostal muscles of either side.

These few illustrations, we hope, will suffice to give the reader some idea of the meaning, object, and mode of application of specific movements in cases of muscular scoliosis.

By a thorough acquaintance with anatomy, physiology and pathology, and a perfect knowledge of these movements, it is clear that they are a most powerful therapeutic agent, particularly in diseases of a chronic nature. The Swedish Government has acknowledged this truth, for nearly fifty years ago an institution of this kind was formed at Stockholm, under royal protection, and has received a yearly grant from the Swedish Diet. The same has been done in other countries since, namely Russia and Prussia; and there is no doubt but what we shall see similar institutions spring up all over the Continent before many years are passed.

Professor Georgii, late lecturer of physiological anatomy at the institution of Stockholm, and one of the two ablest pupils of *Ling*, has now been established in London some years,—and he has succeeded in alleviating or curing many hundreds of chronic diseases that have resisted any other medical treatment.

Mr. Collins, a pupil of Professor Georgii, is lately established in Manchester.

We have now given a few hints with regard to a science which ought to stand high in the estimation of the public for its great usefulness; and we have stated in a few words the existence of a therapeutic agent of a mechanical order, which in efficacy does not give way to any medicinal agent yet known. No one can with reason say that exercise has no effect upon our body. If, then, the most illiterate person will not deny exercise its high value and influence on the economy of our frame, because that influence is so self-evident, how much less can we anticipate opposition or objection to exercise brought into a scientific system, and, according to its rules, applied to the human frame. The philosophy of the thing is as plain as it can be. *Nunquam aliud natura, aliud sapientia dicit.*

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